CLAIMS

1. A sealed and thermally insulating tank for storing a fluid, wherein a flat tank wall comprises, successively in a thickness direction, a secondary thermal insulation barrier (1) comprising a plurality of juxtaposed secondary insulating elements (2), the secondary insulating elements being retained against a support wall (3), a secondary sealing membrane (4) supported by the secondary insulating elements (2) of the secondary thermal insulation barrier (1), a primary thermal insulation barrier (5) comprising a plurality of juxtaposed primary insulating elements (6), the primary insulating elements being retained against the secondary sealing membrane (4), and a primary sealing membrane (7) supported by the primary thermal insulation barrier (5) and intended to be in contact with the fluid contained in the tank,

wherein the primary insulating elements (6) comprise flat parallelepiped insulating panels disposed so as to provide voids (8) between them,

the primary thermal insulation barrier (5) further comprising an anti-convective filler plate (37) disposed in the void between a first flat parallelepiped insulating panel (6) and a second flat parallelepiped insulating panel, the second parallelepiped insulating panel being adjacent to the first parallelepiped insulating panel, wherein the void is defined between a first lateral face of the first flat parallelepiped insulating panel and a second lateral face of the second flat parallelepiped insulating panel, the second lateral face being parallel to the first lateral face, the anti-convective filler plate (37) being straight in a lengthwise direction extending along the first lateral face of the first flat parallelepiped insulating panel and the second lateral face of the second flat parallelepiped insulating panel, the anti-convective filler plate (37) being made of thin continuous material and having a plurality of elongated wall elements (42, 45, 46, 47) extending over substantially the entire width of the void over an entire length of the anti-convective filler plate (37), wherein the elongated wall elements (42, 45, 46, 47) are spaced apart in the thickness direction of the flat tank wall to delimit cells (48) mutually spaced in the thickness direction of the flat tank wall, wherein each cell is extending substantially perpendicular to the thickness direction over substantially the entire width of the void and over the entire length of the anti-convective filler plate (37).

2. The tank as claimed in claim 1, wherein the elongated wall elements are formed by successive portions of a sheet of corrugated material (45) having alternated parallel corrugations extending substantially perpendicular to the thickness direction.

3. The tank as claimed in claim 1, wherein the filler plate has a sandwich structure comprising two parallel continuous sheets (43) spaced apart by said

elongated wall elements (42, 45, 46, 47), said two parallel continuous sheets (43) being arranged against two lateral faces of the first and of the second parallelepiped insulating panel delimiting the void (8).

4. The tank as claimed in claim 3, wherein the elongated wall elements are formed by cylindrical elements (42, 46) extending substantially perpendicular to the thickness direction and fixed between the two parallel continuous sheets.

5. The tank as claimed in claim 3, wherein at least one of the two parallel continuous sheets (43) spaced apart by said elongated wall elements comprises an upper edging portion (44) folded and fixed on the internal face of at least one of the two parallelepiped insulating panels (6) between which the void is formed.

6. The tank as claimed in claim 5, wherein the internal face of the first and/or of the second parallelepiped insulating panel (6) comprises a countersink (35) along the void for accommodating said upper edging portion (44) of the continuous sheet.

7. The tank as claimed in one of claims 1 to 6, wherein the width of the void (8) between the first parallelepiped insulating panel and the second parallelepiped insulating panel (6) is less than 10 mm.

8. The tank as claimed in any one of claims 1 to 7, wherein the anti-convective filler plate (37) is made of flexible material, so that the cells can be easily crushed in the widthwise direction of the void.

9. A vessel (70) for transporting a fluid, the vessel comprising a double hull (72) and a tank (71) as claimed in any one of claims 1 to 8 disposed in the double hull.

10. A transfer system for a fluid, the system comprising a vessel (70) as claimed in claim 9, insulated pipelines (73, 79, 76, 81) arranged so as to connect the tank (71) installed in the hull of the vessel to a floating or onshore storage installation (77) and a pump for conveying a fluid through the insulated pipelines, from or to the floating or onshore storage installation, to or from the tank of the vessel.

11. A method for loading or offloading a vessel (70), wherein a fluid is routed through insulated pipelines (73, 79, 76, 81), from or to a floating or onshore storage installation (77), to or from the tank (71) of the vessel (70) as claimed in claim 9.